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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,990	09/25/2003	James E. Boyle	3816.09	4518

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EXAMINER	
BROWN, JAYME L	

ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 07/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/670,990	BOYLE ET AL.	
	Examiner	Art Unit	
	Jayme L. Brown	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 September 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-32 is/are pending in the application.

4a) Of the above claim(s) 19-32 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 September 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3/8/04, 4/29/04, 6/3/05
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-18, drawn to a method of joining two silicon parts, classified in class 156, subclass 329.

   II. Claims 19-27, drawn to a joined silicon assembly, classified in class 428, subclass 119.

   III. Claims 28-32, drawn to an adhesive for joining parts, classified in class 428, subclass 208.2.

2. The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the product as claimed can be made by another materially different process such as one where the composite is not a flowable mixture of silicon powder and a silica bridging agent.

Inventions III and I are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially

different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case, the product as claimed can be used in a materially different process of using that product such as the adhesive being used to join two parts that are not silicon parts.

Inventions II and III are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not require particles which chemically react to form a silica network when annealed at an elevated temperature of the subcombination. The subcombination has separate utility such as forming flypaper.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. Charles Guenzer on June 8, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 19-32 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

6. The Information disclosure statements filed on 3/8/04, 4/29/04, and 6/3/05 have been considered by the examiner.

7. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

8. The disclosure is objected to because of the following informalities:

On page 2, line 24, it is recommended that the phrase "Virgin polysilicon is the precursor" be changed to - - Virgin polysilicon (virgin poly) is the precursor - - that way it will be clear that virgin polysilicon could also be referred to as virgin poly throughout the specification.

Appropriate correction is required.

9. The use of the trademark FOx® has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

It is recommended that this correction be made throughout the Specification (page 8, lines 5, 14, 23, and 24; page 9, line 1; page 10, line 26).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sadatoshi et al. (JP 55163702) in view of Carlson et al. (U.S. Patent 4,541,035).

Regarding claim 1, Sadatoshi et al. teaches a method of joining two ceramic parts along respective joining areas comprising the steps: providing a flowable mixture of a silicon powder and a silica bridging agent (silicate powder), applying said flowable mixture to at least one of said joining areas, assembling the ceramic parts with said respective joining areas in juxtaposition, and annealing said assembled parts at an

annealing temperature sufficient to convert said silica bridging agent to a silica network See Abstract).

Sadatoshi et al. is silent towards the parts comprising silicon. Sadatoshi et al. also teaches that the mixture (paste) can be used for making printed electric circuit boards (See Abstract).

Carlson et al. teaches a silicon circuit board with multiple levels of patterned conductors. The silicon circuit board has silicon semiconductor chips mounted on it by a thermally-conductive epoxy, for example. The use of monocrystalline silicon has been proposed as a circuit board substrate because it matches the thermal expansion properties of the silicon semiconductor chip and it exhibits a high thermal conductivity, which is beneficial in removing heat from the mounted chips.

One skilled in the art would have readily appreciated that when making printed circuit boards, silicon parts could be used, since it is a known and conventional way to do so. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to use silicon parts in the method of Sadatoshi et al., as suggested by Carlson et al.

Regarding claims 2 and 4-5, Sadatoshi et al. teaches that the annealing temperature is 1300°C to 1700°C (See Abstract). This range is within the scope of the claims in that it is at least 400°C, at least 1200°C, and at least 1300°C.

Regarding claim 3, Sadatoshi et al. is silent toward the annealing temperature being between 900°C and 1100°C. One skilled in the art would have readily appreciated that the annealing temperature would depend on the materials used in the

bonding mixture; therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose materials for the mixture that would be annealed in the desired range in the method of Sadatoshi et al.

Regarding claims 7 and 8, Sadatoshi et al. teaches that the silicon powder has a size of less that 150 μm (See Abstract). This is within the scope of the claims that it is less than 100 μm and between 1 μm and 50 μm.

Regarding claims 9 and 10, Sadatoshi et al. is silent toward the silicon powder having a size distribution with a median range of 10nm to 25nm and with a at least 99% of the particles having a size of less than 100nm. One skilled in the art would have readily appreciated that the size distribution would depend on how the silicon powder was made and what it comprises of; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the silicon power in a certain way in order to achieve the desired particle distribution in the method of Sadatoshi et al.

Regarding claims 6 and 11, Sadatoshi et al. is silent toward the silicon powder comprising virgin polysilicon or that the silicon powder is formed by a CVD process creating particles of silicon. One skilled in the art would have readily appreciated that type of silicon powder used is dependent on the method steps it is to be used for (such as the annealing temperature used or the desired particle size); therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a silicon powder that meets the needs of the application in the method of Sadatoshi et al.

Regarding claims 12-14, Sadatoshi et al. is silent toward the silica bridging agent being a silicone-containing material or a spin-on glass, so that the flowable mixture consists of spin-on glass and silicon powder. It is known to use spin-on glass in semiconductor devices, and one skilled in the art would have readily appreciated that the material used as the silica bridging agent is dependant on the process steps and the desired results in the application. Therefore, it would have been obvious to choose a material, such as spin-on glass, as the silica bridging agent for the flowable mixture in the method of Sadatoshi et al.

Regarding claim 15, Sadatoshi et al. is silent toward the silicon powder having a size distribution with a median range of 10nm to 25nm and with a at least 99% of the particles having a size of less than 100nm. One skilled in the art would have readily appreciated that the size distribution would depend on how the silicon powder was made and what it comprises of; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the silicon power in a certain way in order to achieve the desired particle distribution in the method of Sadatoshi et al.

Regarding claims 16 and 17, Sadatoshi et al. is silent toward the flowable mixture comprising a retardant to slow the setting of the silica bridging agent at room temperature. Sadatoshi et al. is also toward the silica bridging agent being spin-on glass and the retardant comprising of an alcohol that includes less than 1% water. See claims 13-14 above regarding the limitation of the spin-on glass. One skilled in the art would have readily appreciated using a retardant to slow the setting of the silica bridging agent in order to allow time for proper placement and alignment of the parts. One

skilled in the art would have readily recognized choosing a retardant that is compatible with the mixture and slows the setting of the silica bridging agent to a desired amount of time; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a compatible retardant in the flowable mixture in order to obtain the desired amount of working time in the method of Sadatoshi et al.

12. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sadatoshi et al. (JP 55163702) in view of Boyle et al. (U.S. Patent 6,455,395).

Regarding claims 1 and 18, Sadatoshi et al. teaches a method of joining two ceramic parts along respective joining areas comprising the steps: providing a flowable mixture of a silicon powder and a silica bridging agent (silicate powder), applying said flowable mixture to at least one of said joining areas, assembling the ceramic parts with said respective joining areas in juxtaposition, and annealing said assembled parts at an annealing temperature sufficient to convert said silica bridging agent to a silica network See Abstract).

Sadatoshi et al. is silent towards the parts comprising silicon and that the parts form part of a wafer support fixture. Sadatoshi et al. also teaches using the mixture (paste) to bond a variety of articles in a variety of environments, including the semiconductor art.

Boyle et al. is also in the art of semiconductor devices. Boyle et al. teaches bonding silicon structures to make wafer support fixtures. One skilled in the art would have readily appreciated that the flowable mixture (paste) of Sadatoshi et al. can be

used to bond parts in the semiconductor art; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the flowable mixture (paste) to bond silicon structures in order to make the wafer support fixtures suggested by Boyle et al. by the method of Sadatoshi et al.

Regarding claims 2 and 4-5, Sadatoshi et al. teaches that the annealing temperature is 1300°C to 1700°C (See Abstract). This range is within the scope of the claims in that it is at least 400°C, at least 1200°C, and at least 1300°C.

Regarding claim 3, Sadatoshi et al. is silent toward the annealing temperature being between 900°C and 1100°C. One skilled in the art would have readily appreciated that the annealing temperature would depend on the materials used in the bonding mixture; therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose materials for the mixture that would be annealed in the desired range in the method of Sadatoshi et al.

Regarding claims 7 and 8, Sadatoshi et al. teaches that the silicon powder has a size of less that 150 μm (See Abstract). This is within the scope of the claims that it is less than 100 μm and between 1 μm and 50 μm.

Regarding claims 9 and 10, Sadatoshi et al. is silent toward the silicon powder having a size distribution with a median range of 10nm to 25nm and with a at least 99% of the particles having a size of less than 100nm. One skilled in the art would have readily appreciated that the size distribution would depend on how the silicon powder was made and what it comprises of; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the silicon power in a

certain way in order to achieve the desired particle distribution in the method of Sadatoshi et al.

Regarding claims 6 and 11, Sadatoshi et al. is silent toward the silicon powder comprising virgin polysilicon or that the silicon powder is formed by a CVD process creating particles of silicon. One skilled in the art would have readily appreciated that type of silicon powder used is dependent on the method steps it is to be used for (such as the annealing temperature used or the desired particle size); therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a silicon powder that meets the needs of the application in the method of Sadatoshi et al.

Regarding claims 12-14, Sadatoshi et al. is silent toward the silica bridging agent being a silicone-containing material or a spin-on glass, so that the flowable mixture consists of spin-on glass and silicon powder. It is known to use spin-on glass in semiconductor devices, and one skilled in the art would have readily appreciated that the material used as the silica bridging agent is dependant on the process steps and the desired results in the application. Therefore, it would have been obvious to choose a material, such as spin-on glass, as the silica bridging agent for the flowable mixture in the method of Sadatoshi et al.

Regarding claim 15, Sadatoshi et al. is silent toward the silicon powder having a size distribution with a median range of 10nm to 25nm and with a at least 99% of the particles having a size of less than 100nm. One skilled in the art would have readily appreciated that the size distribution would depend on how the silicon powder was

made and what it comprises of; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the silicon power in a certain way in order to achieve the desired particle distribution in the method of Sadatoshi et al.

Regarding claims 16 and 17, Sadatoshi et al. is silent toward the flowable mixture comprising a retardant to slow the setting of the silica bridging agent at room temperature. Sadatoshi et al. is also toward the silica bridging agent being spin-on glass and the retardant comprising of an alcohol that includes less than 1% water. See claims 13-14 above regarding the limitation of the spin-on glass. One skilled in the art would have readily appreciated using a retardant to slow the setting of the silica bridging agent in order to allow time for proper placement and alignment of the parts. One skilled in the art would have readily recognized choosing a retardant that is compatible with the mixture and slows the setting of the silica bridging agent to a desired amount of time; therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a compatible retardant in the flowable mixture in order to obtain the desired amount of working time in the method of Sadatoshi et al.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Jayme L. Brown** whose telephone number is **571-272-8386**. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on 571-272-1156. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jayme L. Brown

Jessica L. Rossi
Primary Examiner